the most generally popular of the sciences. Already the Corporation has shown that it is disposed to further botanical science by admitting students of the University to the Gardens under certain conditions, while the gates are locked to the general public. It is earnestly to be hoped that this may be the first step towards a permanent policy of encouragement of the study of botany in one of the most densely populated centres in the United Kingdom.

SOME of the American whitefish (*Coregonus albus*) turned into the waters of the Marquess of Exeter at Burghley Park a year ago, were lately caught. They were 7 inches long. This is important evidence as to their adaptability to English waters. The National Fish-Culture Association are incubating a large quantity of the ova of this species for acclimatisation purposes.

SINCE 1878 the Ontario and Western Railway Company has been engaged in re-stocking streams in America within the area of its route. Mr. J. C. Anderson, general freight and passenger agent of the Company, writes to the *American Angler* to the effect that, within the past nine years, 2,220,000 trout have been planted by the Company in the Beaverkill, Willowemoc, Neversink, the east and west branch of the Delaware, and their tributaries.

WE have received vols. xxxix. and xl. of the Proceedings of the Literary and Philosophical Society of Liverpool, containing the principal papers read to the Society during the Sessions 1884-85 and 1885-86. Among the papers of scientific interest in vol. xxxix. are: "Observations on the Nematocysts of *Hydra fusca*," and "The Relationship of Palæontology to Biology," by Mr. R. J. H. Gibson; "On a New Organ of Respiration in the Tunicata," and other papers, by Dr. W. A. Herdman; two papers on "Technical Education," by Mr. F. H. Edwards; "The Armorial Bearings of the Isle of Man, their Origin, History, and Meaning," by Mr. John Newton, and "On the Rocky Mountain Goat," by Mr. T. J. Moore. Vol. xl. contains an address on "Modern Scientific Theories of Man," by the President, Dr. William Carter; "Two Curious Papyri in the Khedivial Museum," by Mr. R. L. Benas; "Recent Locust Plagues in Cyprus and North America," by Dr. Nevins; and "Report on a Successful Importation of Living Soles to the United States," by Mr. T. J. Moore. With vol. xl. is bound "The First Report upon the Fauna of Liverpool Bay and the Neighbouring Seas," written by the members of the Liverpool Marine Biology Committee, and edited by Dr. W. A. Herdman.

THE additions to the Zoological Society's Gardens during the past week include two Macaque Monkeys (*Macacus cynomolgus* ♂ ♂) from India, presented respectively by Mr. W. Spooner and Mr. F. A. Adeney; a Purple-faced Monkey (*Semnopithecus leucoprymnus* ♂) from Ceylon, presented by Mr. W. H. Markham; a Black-tailed Godwit (*Limosa ægocephala*), British, presented by Mr. Robert Barclay; a Common Guillemot (*Lomvia troile*), British, presented by Mr. Howard Bunn; a Ring-hals Snake (*Sepedon hæmachates*) from South Africa, presented by Mr. W. L. Holms; a Pinche Monkey (*Midas œdipus*) from Central America, deposited; two Blue-bonnet Parrakeets (*Psephotus hæmatogaster*) from Australia; two Blue-crowned Conures (*Conurus hæmorrhous*) from Brazil, purchased; two Viscachas (*Lagostomus trichodactylus*) born in the Gardens.

OUR ASTRONOMICAL COLUMN

BARON D'ENGELHARDT'S OBSERVATORY.—Baron D'Engelhardt has recently published the first volume of the results of the astronomical observations obtained at his private observatory in Dresden. At first the observatory was erected in the Rue Leubnitz, but was found to be too far from the dwelling-house, and in 1879 the present edifice was erected in the Rue Liebig, close to the Baron's residence, with which it is connected by a covered gallery. The observatory is very completely fitted up. The principal instrument is a fine equatorial by Grubb of 12 inches aperture, replacing one of 8 inches which had been erected in the first observatory. There are two sidereal clocks, a chronograph, a transit-instrument of the bent form, which replaces one by Cook, a very complete Repsold micrometer, and two comet-seekers of special construction. The conduct of the screw of the Repsold micrometer has been very carefully investigated and the inquiry occupies a dozen pages. The observations are principally micrometer measures of nebulæ and star-clusters; but besides these there are very many observations of comets and minor planets, of the phenomena of Jupiter's satellites and of the new stars in the great nebula of Andromeda and near χ_1 Orionis, besides meridian observations of the moon and culminator stars. The volume, which is a very handsome one, contains four plates representing different parts of the observatory. The geographical position of the centre of the transit-instrument is given as lat. = 51° 2′ 19″ N., and long. = 0h. 54m. 54·74s. East from Greenwich.

NEW RED STAR.—Circular No. 16 of the Liverpool Astronomical Society states that on the nights of March 23 and 27 a red star, 7·5 magnitude, was observed 5s. *f* and 3′ *s* of 26 Cygni. There is no star in the D.M. at this place. The spectrum of the new star is a fine specimen of type III. Place of 26 Cygni for 1887, R.A. 19h. 58m. 9s., Decl. 49° 46′·9 N.

THE PARALLAX OF Σ 1516.—It appears, from the researches of M. O. Struve on the relative motion of the components of this double star, that the fainter star does not participate in the proper motion of the brighter component, and that they therefore, in all probability, constitute a merely optical pair without physical connexion. Herr Berberich, from a discussion of a series of measures of distances made by Prof. Winnecke, found the relative parallax of the brighter star, compared with the fainter component, to be $0''\cdot199 \pm 0''\cdot05$ (*Astron. Nachr.*, No. 2624). Recently, Dr. L. de Ball has made a series of observations with the equatorial of the Cointe Observatory at Liège, extending from 1885 April to 1886 June, for the purpose of determining this quantity. From sixty-seven observations of relative position-angle he finds $\pi = 0''\cdot091$, and from sixty-four observations of relative distance, $\pi = 0''\cdot112$, and combining these according to their respective weights, $\pi = 0''\cdot104$, with mean error $\pm 0''\cdot008$.

ASTRONOMICAL PHENOMENA FOR THE WEEK 1887 APRIL 10-16

(FOR the reckoning of time the civil day, commencing at Greenwich mean midnight, counting the hours on to 24, is here employed.)

At Greenwich on April 10

Sun rises, 5h. 18m.; souths, 12h. 1m. 21·4s.; sets, 18h. 45m.; decl. on meridian, 7° 56′ N.: Sidereal Time at Sunset, 8h. 0m.

Moon (at Last Quarter on April 15) rises, 20h. 34m.*; souths, 1h. 47m.; sets, 6h. 50m.; decl. on meridian, 11° 44′ S.

Planet	Rises	Souths	Sets	Decl. on meridian
	h. m.	h. m.	h. m.	° ′
Mercury	4 42	10 30	16 18	3 8 S.
Venus	6 15	13 59	21 43	18 32 N.
Mars	5 25	12 14	19 3	8 47 N.
Jupiter	19 44*	0 51	5 58	10 55 S.
Saturn	9 46	17 55	2 4*	22 28 N.

* Indicates that the rising is that of the preceding evening and the setting that of the following morning.

Occultations of Stars by the Moon (visible at Greenwich)

April	Star	Mag.	Disap.	Reap.	Corresponding angles from vertex to right for inverted image
			h. m.	h. m.	° °
11	49 Libræ	5½	0 13	near approach	318 —
12	29 Ophiuchi	6	1 16	2 19	24 274
15	57 Sagittarii	5½	2 56	4 9	79 238

April	h.	
15	3	Mercury at greatest distance from the Sun.

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Variable Stars

Star	R.A. h. m.	Decl. ° ′		h. m.	
R Ceti	2 20·3 ...	0 41 S. ...	Apr. 14,		*M*
Algol	3 0·8 ...	40 31 N. ...	,, 12,	3 7	*m*
			,, 14,	23 56	*m*
ζ Geminorum ...	6 57·4 ...	20 44 N. ...	,, 10,	2 0	*m*
			15,	2 0	*M*
U Monocerotis ...	7 25·4 ...	9 35 S. ...	,, 15,		*m*
R Virginis	12 32·8 ...	7 37 N. ...	,, 13,		*m*
δ Libræ	14 54·9 ...	8 4 S. ...	,, 13,	21 29	*m*
R Herculis	16 1·2 ...	18 41 N. ...	,, 15,		*M*
U Ophiuchi... ...	17 10·8 ...	1 20 N. ...	,, 13,	3 24	*m*
		and at intervals of		20 8	
W Sagittarii ...	17 57·8 ...	29 35 S. ...	Apr. 10,	3 0	*m*
U Sagittarii... ...	18 25·2 ...	19 12 S. ...	,, 11,	21 0	*m*
			,, 14,	20 0	*M*
R Lyræ	18 51·9 ...	43 48 N. ...	,, 15,		*M*
η Aquilæ	19 46·7 ...	0 43 N. ...	,, 14,	2 0	*m*
δ Cephei	22 25·0 ...	57 50 N. ...	,, 13,	4 0	*m*

M signifies maximum; *m* minimum.

Meteor-Showers

	R.A.	Decl.
Near β Ursæ Majoris.. ...	162°	57° N.
ν Virginis...	180	7 N.
μ Draconis	249	51 N.
μ Herculis	270	25 N.

GEOGRAPHICAL NOTES

MR. GEORGE GRENFELL has recently made a successful ascent of the great Quango tributary of the Congo. In company with Mr. Bentley, in the steamer *Peace*, he succeeded in reaching the Kikunji Falls, the point at which Major von Mechow, descending the Quango from the south, was obliged to turn back in 1880. About six miles above the junction of the Kasai and the Quango they found another large tributary, the Djuma, entering the river from the east, which presented so great a volume of water that it was a matter of uncertainty which was the larger stream. A little beyond this the course of the Quango veered round, first south-south-west, and then west; at 4° 30′ S. lat. it had come back to its usual northerly course, and maintained it for the remainder of the journey. The Kikunji Falls (5° 8′ S. lat.) are about 3 feet high, and though insurmountable to the *Peace*, are said by Mr. Grenfell to be no obstacle to communication by canoes and small craft.

IN a letter from the Rev. W. G. Lawes, dated Port Moresby, January 20, it is stated that an Expedition is being equipped under the leadership of Mr. Vogan, the Curator of the Auckland Museum, with the intention of attempting, as soon as the rainy season was over, to cross South-East New Guinea, from Freshwater Bay to Huon Gulf.

THE April number of the Proceedings of the Royal Geographical Society is largely devoted to papers on Central Asia. First we have Mr. Delmar Morgan's account of Prjevalsky's journeys and discoveries in Central Asia. Mr. Morgan also contributes a translation in abstract of a recent lecture by M. Potanin on his journey in North-Western China and Eastern Tibet, which is followed by an account of the travels of Messrs. James, Younghusband, and Fulford in Northern and Eastern Manchuria. In this last will be found some welcome details concerning of the country not previously described.

ACCORDING to Dr. Hans Schinz, who has been recently in the Lake Ngami region, that lake is not dried up, though its dimensions are gradually decreasing. The River Okovango forms an extensive marsh on the north-west, which sends very little water a part into the lake during the dry season.

IN a paper by Dr. Ochsenius in the *Zeitschrift* of the Berlin Geological Society, on the age of certain parts of the South American Andes, are some details of geographical and ethnological interest. The author believes that the South American Cordilleras, or at least a portion of them, are no older than the Quaternary (as contrasted with the certainly older coast Cordilleras), and infers, therefore, that Lake Titicaca and the surrounding region must have been raised to its present elevation of about 13,000 feet within the historical period. Dr. Ochsenius therefore maintains that the enormous ruins of the old Inca city Tihuanaco on that lake admit of no other explanation than that these colossal monoliths were not worked at their present elevation, far less transported thither; it is incredible that the highly civilised Incas would have located their emporium on a tableland now almost uninhabitable. The author supports his conclusions by the fact that representatives of the Pacific fauna still live in Lake Titicaca.

NEWS of Herr G. A. Krause, who is now investigating the district between the Gold Coast and Timbuctoo, has reached Berlin. The traveller arrived at Woghodogho, the capital of Mosi, in October 1886. He obtained permission from the King of Mosi to continue his journey in a northerly direction to Duensa, on his way to Timbuctoo. He hoped to reach the former place in seventeen or eighteen days, to arrive at Sarafaram in four or five days more, and then to descend the Niger to Kabara, the port of Timbuctoo. Herr Krause describes the country between Salanga and the capital of Mosi as being perfectly plain at first, and then followed by a district of low hills and another plain. A day's journey north of Walawala, the traveller crossed the Upper Volta, the source of which lies probably in a north-easterly direction.

ON CERTAIN MODERN DEVELOPMENTS OF GRAHAM'S IDEAS CONCERNING THE CONSTITUTION OF MATTER[1]

II.

A QUARTER of a century has elapsed since Graham formulated his conceptions concerning the constitution of matter. I wish now to indicate, as briefly as may be, how these conceptions have developed during these five-and-twenty years.

The idea of the essential unity of matter has a singular fascination for the human mind. It may be that it has its germ in the persistency with which every mind, even that of a child, seeks to get at first principles. The most superficial reader of the history of intellectual evolution cannot fail to perceive how greatly it has modified and directed the development of scientific thought. The whole course of chemistry, for example, has been controlled by this fundamental conception. The half-educated student of to-day may smile at the notion of the transmutation of the metals which held such sway over the minds of the early alchemists, but the men who followed this "*Ignis fatuus*" with weary faltering steps, and who frequently sank under the burden of disappointed hope and the sense that to them it was not given to know the light, felt that this idea rested on a rational basis. They, like we, could give a reason for the faith that was in them. And yet no article of scientific doctrine has in these later times suffered greater vicissitude. Men's ideas concerning the essential unity of things must have received a rude shock when it was found that such a thing as water was not only complex, but was made of bodies strangely contrasted in properties; that the air was still less simple in composition; and that, as it appeared, almost every form of earth could, by torture, be made to give up some dissimilar thing. The brilliant discoveries of Davy, which made the early years of this century an epoch in the history of science, seemed to open out a vista to which there was no conceivable ending. The order of things was not towards simplification: it tended rather towards complexity. And yet Davy himself seemed unable or unwilling to push his way along the path of which the world regarded him as the pioneer. It may be that he was unable to shake himself free from the domination of the schoolmen, or that he unconsciously felt the truth of the principles to which his own discoveries seemed opposed. It is difficult otherwise to account for the tardiness with which he accepted the hypothesis of Dalton; even to the last the Daltonian atom had nothing distinctive to Davy beyond its combining weight. Davy never wholly committed himself to a belief in the indivisibility of the atom: that indivisibility was the very essence of Dalton's creed. In arguing with a friend concerning the principle of multiple proportion, Dalton would clinch the discussion by some such statement as "Thou knows it must be so, for no man can split an atom." Even Thomas Thomson, whom I have already characterised as the

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[1] The Triennial "Graham Lecture," given in the Hall of the Andersonian Institution, Glasgow, on March 16, by Prof. T. E. Thorpe, F.R.S. Continued from p. 524.

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